Canon

SERIAL INTERFACE-30

For use with
the S-15,S-16 and Typestar 7
personal typewriters

Introduction

This booklet provides instructions on the installation and operating conditions of the Canon Serial I/F-30.

This interface can be used to connect Canon's S-15, S-16 and Typestar 7 electronic typewriters to a personal computer to enable them to be used as a line printer for high-quality printouts.
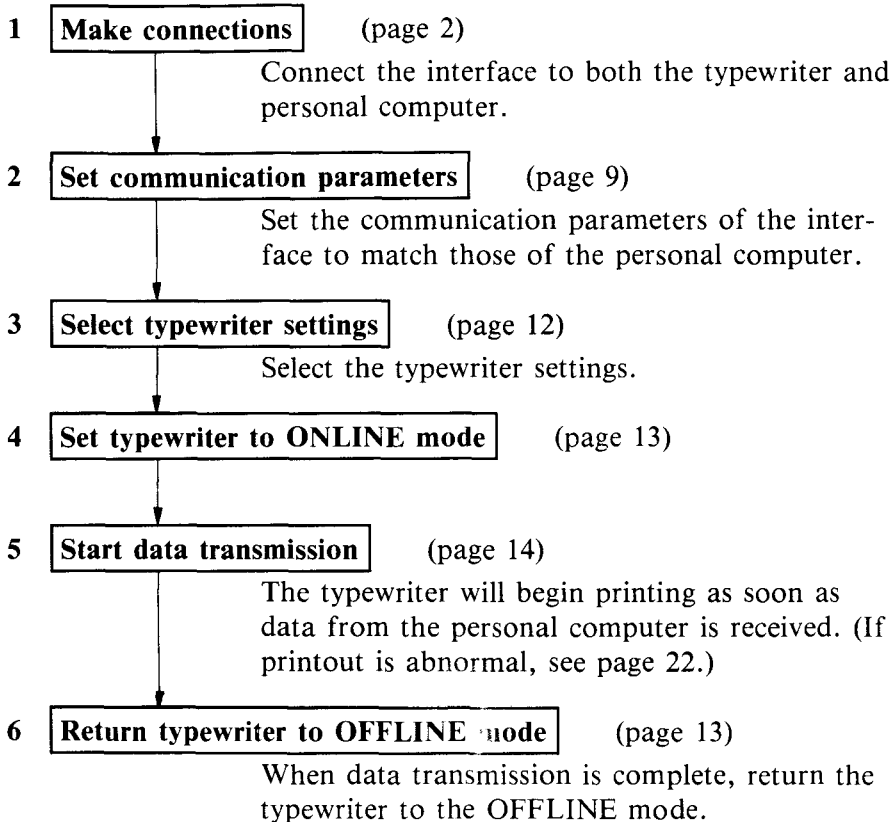
- *This interface is to be used under the same operating conditions as Canon's electronic typewriters.*
- *See the operation manual provided with the typewriter for instructions on its use.*
- *The typewriter character set determines what characters can be printed out, and it may not necessarily match the character set of the personal computer. If printout is not normal, the cause may be differences in the respective character sets.*
- *The cable and connectors needed to connect this interface with a personal computer is not provided. The necessary cable with connectors can be purchased commercially, or the cable and connectors purchased separately, and the cable wired according to the wiring diagrams in this manual.*

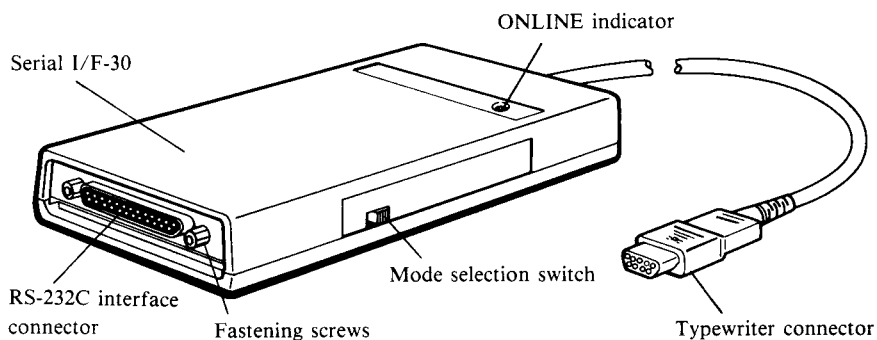# Contents

Data Transfer Procedure

The procedure for data transfer, from connections to actual data transmission, is summarized below. For details, refer to the page noted in parentheses at the end of each step.

1 | Make connections | (page 2)

Connect the interface to both the typewriter and personal computer.

2 | Set communication parameters | (page 9)

Set the communication parameters of the interface to match those of the personal computer.

3 | Select typewriter settings | (page 12)

Select the typewriter settings.

4 | Set typewriter to ONLINE mode | (page 13)

5 | Start data transmission | (page 14)

The typewriter will begin printing as soon as data from the personal computer is received. (If printout is abnormal, see page 22.)

6 | Return typewriter to OFFLINE mode | (page 13)

When data transmission is complete, return the typewriter to the OFFLINE mode.

Connections

Connectors and Indicators

Part Names

ONLINE indicator

Serial I/F-30

RS-232C interface connector

Fastening screws

Mode selection switch

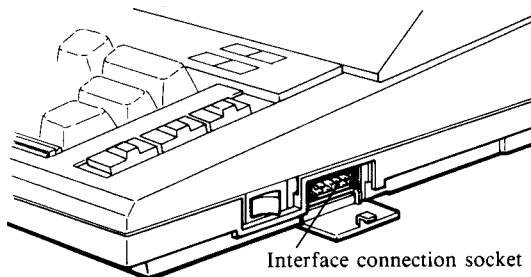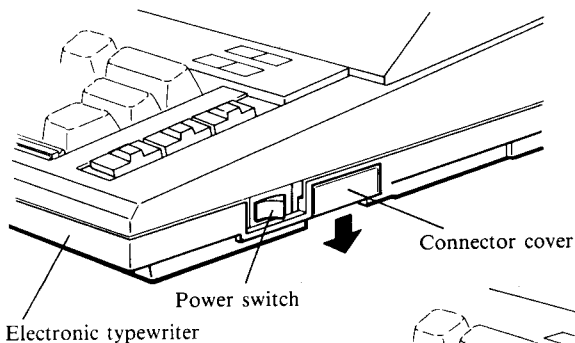Typewriter connector

- The socket for the typewriter connector is located on the right side of the typewriter and is protected by a cover. To open, press on the cover and then push down gently.

Connector cover

Power switch

Electronic typewriter

Interface connection socket

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Controls and Connections

- **ONLINE Indicator**

  The ONLINE indicator lights when the typewriter is in the on-line mode.

- **RS-232C Interface Connector**

  Connect the interface to the RS-232C connector on the personal computer with a cable for use with RS-232C interface connectors. After attaching the connectors, secure them by tightening the fastening screws.
  - *The nuts for the connector screws on the Serial I/F-30 are standard thread. If the screws on the cable are ISO thread, replace the standard thread nuts with the ISO thread nuts provided.*
  - *See pages 4 through 6 for an explanation of the pin assignments.*

- **Mode Selection Switch**

  The mode selection switch determines the assignments of the connector pins. If the cable used to connect the personal computer and the interface is designed for use with an interface, set the switch to the TERMINAL position. If the cable is made for use with a modem, set the switch to the MODEM position (see page 4).

- **Typewriter Connector**

  Plug the typewriter connector into the interface connection socket on the typewriter (see page 2).
  - *Make sure the power switch of the typewriter is turned off before connecting it to the interface.*

RS-232C Interface Connector

Signal and electrical characteristics of RS-232C connectors conform to established standards. However, pin functions and signal routing vary from one type of computer to another. The illustrations below show signal assignments for operation in the terminal and modem modes.

* *See the operating instructions for the personal computer for an explanation of the signal assignments at the computer side.*
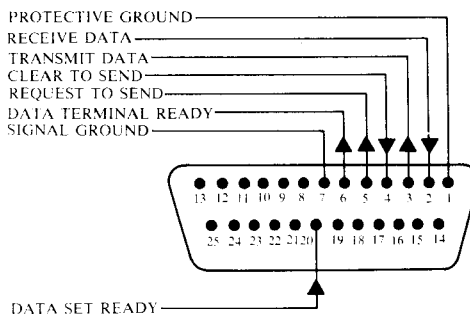
Signal Assignment

1. TERMINAL Mode

Signal assignments in the terminal mode are as shown below.
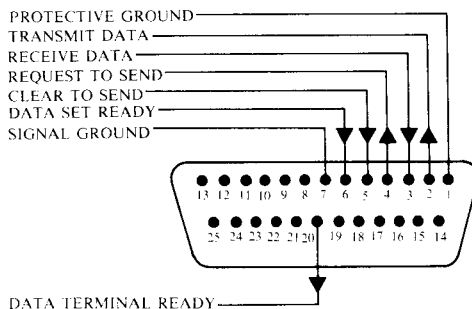
2. MODEM Mode

When the mode switch is set to the MODEM position, the functions of pins 2 and 3, 4 and 5, and 6 and 20 are reversed as shown below.

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Control Signals

The letters T and M below indicate terminal and modem mode settings respectively.

Pin No. T	Pin No. M	Signal	Function	Signal Direction	Computer Side
1	1	PROTECTIVE GROUND	Ground		PROTECTIVE GROUND
2	3	TRANSMIT DATA	Sends X-ON/X-OFF control signals from interface to computer.	→	RECEIVE DATA
3	2	RECEIVE DATA	Receives data from computer.	←	TRANSMIT DATA
4	5	REQUEST TO SEND	Indicates status of interface input buffer.	→	CLEAR TO SEND
5	4	CLEAR TO SEND	Indicates whether or not computer is ready to transmit data. Must be HIGH during transmission.	←	REQUEST TO SEND
6	20	DATA SET READY	Indicates whether or not computer is ready for operation. Must be HIGH when in online mode.	←	DATA TERMINAL READY
7	7	SIGNAL GROUND	Common ground for all data and control signals.		SIGNAL GROUND
20	6	DATA TERMINAL READY	Indicates whether or not interface is ready for operation. HIGH in online mode and LOW in offline mode.	→	DATA SET READY

See next section for detailed explanation of X-ON/X-OFF and REQUEST TO SEND signals.

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X-ON/X-OFF and REQUEST TO SEND (RS)

When the interface receive buffer contains more than 448 bytes of data, the interface sends the X-OFF signal (DC3) to the computer to temporarily halt data transmission. When the contents of the buffer drop to 64 bytes, the X-ON signal (DC1) is sent to the computer to restart data transmission.

The X-ON/X-OFF function may not work with some personal computers. If so, the REQUEST TO SEND signal is used to control data transmission.

The REQUEST TO SEND signal is HIGH when the typewriter is in the online mode and lets the computer know that the interface is ready to receive data. When the interface buffer contains 464 bytes, the signal changes to LOW to tell the computer to temporarily halt data transmission. When the number of bytes in the buffer drops to 432, the signal again becomes HIGH to restart the flow of data from the computer.

Communication Parameters

Explanation of Communication Parameters

When the Serial I/F-30 is connected to a personal computer, data can be transferred only when the communication parameters for the device sending the data (the personal computer) and the device receiving the data (the interface) coincide.

The following parameter settings are possible with the Serial I/F-30.

| Parameter	Settings
Character code	ASCII, LOCAL (Typestar 7 only)
Baud rate	300, 600, 1200 bps
Data bits	7, 8 bits
Parity	ODD,EVEN,NONE
Stop bits	1, 2 bits
Line feed method	CR, CR/LF

Character Codes

When the Serial I/F-30 is used with the Typestar 7, you can choose between the ASCII or LOCAL character code settings. The setting for the S-15 and the S-16 is factory preset and cannot be changed. Note also that the character codes for the S-15 and S-16 are different from those for the Typestar 7. (See page 15 for the character code tables.)

Baud Rate

The baud rate determines the number of bits of data that are sent per second. The unit bps (bits per second) is used to express this quantity. For example, 300 bps means that 300 bits of data are transferred each second.

Data Format

Data must be sent in a serial data format.
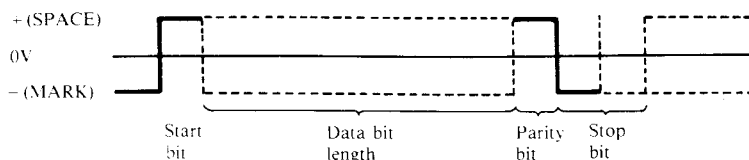
Any of the data formats given in the table below may be used.

Start bit	Data bits	Parity bit	Stop bits	Total bit count
1	7	ODD	1	10
1	7	ODD	2	11
1	7	EVEN	1	10
1	7	EVEN	2	11
1	8	NONE	1	10
1	8	NONE	2	11
1	8	ODD	1	11
1	8	EVEN	1	11

- *The start bit number is fixed at 1 bit.*
- *When ODD or EVEN parity is chosen, data bit length will be increased by one bit. If NONE is chosen, no bits will be added.*

Line Feed Method

You can choose between two types of line feed to be executed upon reception of the CR code ($0D_H$): a carrier return only (CR), or a carrier return plus line feed (CR/LF).

Initial Settings of Communication Parameters

The initial settings of the communication parameters for the Serial I/F-30 are given below. If it is necessary to change any of these settings, see "Setting Communication Parameters" below for instructions.

Character code:	ASCII (Typestar 7)
Baud rate:	1200 bps
Data bits:	7 bits
Parity bit:	Even
Stop bit:	1 bit
Line feed method:	CR/LF

- *The communication parameters set will remain effective until they are reset.*
- *The values set for the communication parameters are retained in the memory when the power to the interface is turned off if dry batteries or the NiCd battery pack is installed, or the AC adapter is connected.*

Setting Communication Parameters

The typewriter keyboard is used to set the communication parameters for the interface. Before changing any of the parameters, be sure that the typewriter is in the offline mode (see page 13).

When using the S-15

1. Insert a sheet of paper.
2. Press the ⌐CODE⌐ key and then the ⌐M⌐ key. The current baud rate setting will be printed out.
   ⌐BAUD RATE : 1200⌐

3. Each time the |**BACKSPACE**| key is pressed, the next baud rate setting will be printed out.
       BAUD RATE : 1200
                 600
                 300
               1200

4. When the desired setting is printed, press the |**RETURN**| key to set it as the new rate. Once the baud rate has been set, the next parameter, data bit length, will be printed out.
       |**BIT LENGTH : 7**|

5. As above, use the |**BACKSPACE**| key to choose the desired value, and then press the |**RETURN**| key to make the new setting.

6. Repeat the above procedure to set the parity bit, stop bit, and line feed method.

7. When settings for all parameters have been completed, press the |**CODE**| key.

When using the S-16 or Typestar 7

1. With the Typestar 7, press the |**CODE**| key and then the |**MODE**| key to display the current character code setting.
       |**CODE : ASCII**|

   With the S-16, press the |**CODE**| key and then the |**M**| key to display the current baud rate setting.
       |**BAUD RATE : 1200**|

   Since the character code setting does not apply to the S-16, proceed to step 4.

2. Each time the |→| key is pressed, the character code display will change.
       |**CODE : LOCAL**|

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3. When the display shows the desired character code, press the
   RETURN key to make the setting. Once the character code is
   set, the baud rate setting will be displayed.
   BAUD RATE : 1200

4. Each time the → key is pressed, the value displayed will
   change. When the desired baud rate is displayed, press the
   RETURN key to make the setting. Once the baud rate is
   set, the next parameter, bit length, will be displayed.

5. Repeat the above procedure to set the bit length, parity bit, stop
   bit, and line feed method.

6. When all the parameters are set, press the **CODE** key.

Preparing the Typewriter

Typewriter Settings

The characteristics of the printout produced by the typewriter depend on the typewriter settings. Be sure to select the desired settings before you switch the typewriter to the online mode.
See your typewriter manual for instructions on how to make the various settings shown below.

- **Left margin, Right margin**
- **Tab**
- **Line pitch**
- **Typestyle**
- **Character pitch**
  On the Typestar 7, the character pitch is automatically set for the typestyle chosen. On the S-15 and S-16, the character pitch should be set appropriately for the daisy wheel used.
- **Print mode**
  The print mode on the Typestar 7 is automatically set to normal print. For the S-15 and S-16, the setting must be made manually.
  - *Settings for items other than the above will be ignored.*

ONLINE Mode and OFFLINE Mode

ONLINE Mode

- When the typewriter is in the online mode, the Serial I/F-30 can receive data from the computer and print it out on the typewriter. Set the typewriter to the online mode for data transmission.

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• The ONLINE indicator on the Serial I/F-30 will light when it is ready to receive data when the typewriter is in the online mode. In addition, the message "ON LINE" will appear on the display of the S-16 and Typestar 7.

OFFLINE Mode

• The typewriter can be used normally when it is in the offline mode.
• Communication parameters and typewriter settings must be made when the typewriter is in the offline mode.

Switching Between ONLINE and OFFLINE Modes

Press the CODE key and then the O key.
• When the typewriter is in the online mode, the ONLINE indicator on the interface will light. On the S-16 and the Typestar 7, the message "ON LINE" will appear on the display as well.
• When the typewriter is in the offline mode, the ONLINE indicator on the interface will be out, and the message "ON LINE" will be cleared from the display of the S-16 and Typestar 7.
• The typewriter can be switched between the online and offline modes by pressing CODE and then O .
  * *If you press CODE and O when the typewriter is not connected to the interface, an alarm will sound.*
  * *You cannot switch between the online mode and offline mode during printing. Wait until printing has been completed, or interrupt printing, to switch to the offline mode.*
  * *When the typewriter is switched from the offline to the online mode, the contents of the typewriter buffer are automatically cleared.*
  * *The typewriter is in the offline mode when it is first turned on.*

Data Transfer

After setting the communication parameters, switch the typewriter to the online mode to start printing. Printing will be performed according to the character and control codes sent from the computer.

If the character codes you wish to send to the typewriter for printout are different from the codes listed in the character code tables, or if you wish to send control codes, a command to convert character codes to the actual characters for printout should be included in the program to be run on the computer.

- *For details on how to use a command to convert character codes into characters, see the operating instructions for the computer used.*

Character codes are expressed in hexadecimal notation. The two-digit representations for the characters in the character code tables are formed by placing the values (0 - 7) along the top of the table to the left of the values (0 - F) down the side of the table.
Example: In the ASCII character code table,
             A is 41_H and k is $6B_H$

The letter H following the codes means they represent hexadecimal values.
In the hexadecimal number system, the letters A through F are used to represent the numbers 10 through 15.

Character Code Tables

Character Code Table for S-15 and S-16

	0	1	2	3	4	5	6	7
0			SP	0	´	P	`	p
1			!	1	A	Q	a	q
2			''	2	B	R	b	r
3			#	3	C	S	c	s
4			$	4	D	T	d	t
5			%	5	E	U	e	u
6			&	6	F	V	f	v
7	BEL		'	7	G	W	g	w
8	BS		(	8	H	X	h	x
9	HT		)	9	I	Y	i	y
A	LF		*	:	J	Z	j	z
B		ESC	+	;	K	¨	k	¢
C			,	SP	L	ç	l	¡
D	CR		-	=	M	¿	m	£
E			.	SP	N	^	n	~
F			/	?	O	—	o	

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Character Code Table for Typestar 7

• ASCII Character Code Table

If your personal computer uses the ASCII character codes, selecting the ASCII character code setting on the Typestar 7 will allow you to print out program listings and other data without having to make any character conversions.

	0	1	2	3	4	5	6	7
0			SP	0	@	P	`	p
1			!	1	A	Q	a	q
2			"	2	B	R	b	r
3			#	3	C	S	c	s
4			$	4	D	T	d	t
5			%	5	E	U	e	u
6			&	6	F	V	f	v
7	BEL		'	7	G	W	g	w
8	BS		(	8	H	X	h	x
9	HT		)	9	I	Y	i	y
A	LF		*	:	J	Z	j	z
B		ESC	+	;	K	[	k	{
C			,	<	L	\	l	|
D	CR		-	=	M	]	m	}
E			.	>	N	^	n	~
F			/	?	O	—	o	

The LOCAL character codes are used to print the characters shown on the Typestar 7 keyboard. When the LOCAL character codes are selected, the characters in the table below can be printed out.

See page 19 for an explanation of the SO and SI codes.

SO with 7-bit data bit length ──────▶

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			SP	0	@	P	`	p			SP	°				
1			!	1	A	Q	a	q			¡	±	`	à		
2			"	2	B	R	b	r			¢	²	'	ç		
3			#	3	C	S	c	s			£	³	^	è	a̲	
4			$	4	D	T	d	t			$	~		é		
5			%	5	E	U	e	u			¥			ì		
6			&	6	F	V	f	v			#	¶		ò		
7	BEL		'	7	G	W	g	w			§			ù		
8	BS		(	8	H	X	h	x				‥				
9	HT		)	9	I	Y	i	y			–					
A	LF		*	:	J	Z	j	z			│					
B		ESC	+	;	K	[	k	§							º̲	ß
C			,	<	L	¥	l	│					1/4			
D	CR		–	=	M	]	m	¶					1/2			
E	SO		.	>	N		n	~			ñ					
F	SI		/	?	O	_	o				Ñ	¿				

U.S.A. only

SO with 7-bit data bit length →											2	3	4	5	6	7
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			SP	0	@	P	`	p			SP	°				
1			!	1	A	Q	a	q			¡		`	à		
2			"	2	B	R	b	r				2	´	ç		
3			£	3	C	S	c	s			£	3	^	è	a̲	
4			$	4	D	T	d	t			$		~	é		
5			‰	5	E	U	e	u						í		
6			&	6	F	V	f	v			#			ó		
7	BEL		'	7	G	W	g	w			§			ù		
8	BS		(	8	H	X	h	x					··			
9	HT		)	9	I	Y	i	y			—			ℓ		
A	LF		*	:	J	Z	j	z			|					
B		ESC	+	;	K	[	k	⦂							º̲	ß
C			,	<	L	\	l	|				1/4		1/8		
D	CR		−	=	M	]	m	}				1/2				
E	SO		.	>	N	^	n	~			ñ					
F	SI		/	?	O	_	o				Ñ	¿			'n	

U.K. only

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Control Codes

In addition to the character codes listed in the previous tables, the following control codes can also be used. Upon receiving a control code, the typewriter will execute the corresponding function.

Control Code		Function
Code Name	**Hex Code**	
BEL	07	Bell tone (alarm)
BS	08	Backspace
HT	09	Horizontal tab
LF	0A	Line feed
CR	0D	Carrier return
SO	0E	Shift out
SI	0F	Shift in
ESC!	1B 21	Printing stop

- *Either CR or CR/LF can be chosen as the function corresponding to the CR code.*
- *The SO and SI control codes are effective only with the Typestar 7 in the LO-CAL Character Code setting, and then only when the data bit length is 7 bits. The SO code works to shift the characters of the LOCAL character code table from columns A to F into columns 2 to 7 to create an expanded character set (see pages 16 and 17). The SI code cancels the SO code.*
  Example: Under the SO code:
  £ is 23н and ¿ is 3Fн

Printing Interrupt and Restart

Printing Interrupt

Printing is interrupted when:
1) the ESC! code is received.
2) the ⌫ key is pressed.

Printing Restart

• Printing restarts when the **RETURN** key is pressed.

Special Considerations

• Accents are printed out properly only when the Typestar 7 is set for LOCAL characters. In all other cases, accents will be printed out like any other character; it is not possible to overprint with an accent.

• If a meaningless code is received, it will be ignored and printing will continue unaffected. In addition, when the data bit length for the S-15 or S-16 is set for 8 bits, the high order bit will be ignored and the data will be treated as 7-bit data.

• The typewriter alarm will sound in the event of a reception error (e.g.,overrun, framing error, etc.).

Typewriter Power Supply

If Batteries or NiCd Battery Pack Becomes Weak During Data Reception

If the typewriter batteries become weak during reception of data from the personal computer, the alarm will sound on the S-15 and S-16, and the display on the Typestar 7 will change to let you know that the batteries need replacing.

- When the batteries of the S-15 or S-16 become weak, an alarm will sound the same as when you use the machine as an ordinary typewriter. For an explanation of the alarm signals, see the operating instructions for the S-15 or S-16.
- When the batteries of the Typestar 7 become weak, the display will alternately show the message "ON LINE" and the battery change indicator symbols " ⬚⬚⬚ ".
- On the S-16, the display will alternate between the messages "ON LINE" and "LITHIUM ⬚ " to indicate that the lithium battery should be replaced.

When the batteries become weak, either replace the set of dry batteries, or recharge the NiCd battery pack. See the operating instructions for the typewriter for directions on how to change the batteries.

Changing the Batteries During Data Transfer

The contents of the buffer will be lost if the typewriter is stopped and the batteries replaced during data transfer. It is recommeded that the AC adapter be used to power the typewriter when it is used as a printer.

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Abnormal Printout

- When the typewriter alarm sounds at the start of data transfer and printing cannot be executed, it is possible that the communication parameters of the interface and personal computer do not match. Check to see that the communication parameters are set correctly and that they match.
  - *The typewriter alarm will also sound when a reception error (e.g.,overrun, framing error) occurs.*

- When normal printing cannot be executed even though the communication parameters match, it is possible that the connecting cable is not suitable. Make sure that the pin functions and the signal assignments for both RS-232C interface connectors are correct.

- The alarm will sound continuously if the typewriter is set to the online mode without first completing the connection to the personal computer. Set the typewriter to the online mode only after making all connections.

- If characters differing from the transferred data are printed, check to see that the character codes for the computer and the typewriter are the same.

Specifications

Operating temperature :	·5 - 35°C (41°F - 95°F)
Operating humidity :	10 - 90%
Power supply voltage :	3 - 12 V (D-sub 9-pin)
Power consumption :	300 mW max.

Specifications subject to change without notice.

FCC regulations

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
- Reorient the receiving antenna.
- Relocate the computer with respect to the receiver.
- Move the computer away from the receiver.
- Plug the computer into a different outlet so that computer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commision helpful:

"How To Identify and Resolve Radio-TV Interference Problems".
This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402, Stock No. 004-000-00345-4.

* Use of shielded cable is required to comply with Class B limits of FCC rules.

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NOTE

NOTE